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## TRAINING OF YOUNG PILOTS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 77 signed to press 31 Mar 77 pp 8-9

[Article by Guards Maj V. Yakunenko, military pilot first class, commander of an outstanding squadron: "Retraining Young Pilots"]

[Text] The arrival of new recruits is always a noteworthy event in the life of a unit or subunit. Of course, the personnel of a fighting collective greet the graduates of aviation schools with great interest. They know from experience that the new pilot-engineers and navigator-engineers, after receiving higher education, usually master our intricate modern equipment and the use of jet aircraft in battle.

At the same time, the arrival of new people in the unit presents the command, political workers, and party and Komsomol organizations with several complex problems. For example, it is very important that during the period when the new aviators are being worked into the group the overall level of combat readiness of the subunit and the high scores in combat and political training won by the collective earlier are not lowered. The arrival of new personnel also requires certain adjustments in the training process, precise planning and organization of their theoretical and flight training, and purposeful preparation of instructors and team commanders with due regard for the specific characteristics of working with subordinates who have not yet developed either flying habits or moral-psychological qualities.

And it is precisely here as nowhere else that the individual approach to each trainee, a comprehensive consideration of his personal characteristics, is needed. One must be able to note everything positive at the proper time and then develop it and eliminate those things which stand in the way of rapid, solid development of an aerial fighter. In addition, to me it seems essential from the very arrival of the lieutenants in the unit to instill them with the conviction that the key conditions for their professional growth and attaining high levels of combat skill are a responsible, uncompromising attitude toward training and purposefulness and persistence in performing assigned missions. Without this there cannot be a true aerial fighter.

I recall a few years ago how Lt. Valeriy Chuprik stood out among the new pilots who joined our unit. He was the first in the squadron to take his place according to the program and the first to fly on his own.

What was the "secret" of his success? Perhaps he had some exceptional talent or was simply lucky? Because one still hears such opinions with reference to aviators who reach a high level of professional skill more rapidly than others, I think we should discuss this.

Lieutenant Chuprik had successfully completed a higher military aviation school for pilots. Upon arrival in the unit he immediately became part of his new collective. His sound theoretical training was unquestionably a good foundation for mastering combat use of the supersonic missile plane which he had flown while he was a cadet. But soon he had to be re-trained for a fundamentally new aircraft. Naturally, his flying habits from the former aircraft made practical mastery of the new, improved machine somewhat slower. Certain actions which had already become habitual had to be overcome, and many new habits had to be developed from the start. In the face of the difficulties the young officer applied a strict training rhythm, persistence, and purposefulness. He adopted the rule of never putting off today's assignment and work until tomorrow.

I remember one case where an intensive day of flying was coming to an end. A strong side wind suddenly arose. The pilots came in to land confidently and set their aircraft down smoothly in the precise landing zone. Climbing out of the cockpits they gathered in groups at the parking place still wearing their flight gear and began sharing impressions. At this time Chuprik came up to me. I had a feeling that it was difficult for the young officer to open the conversation. But I knew that he would not evade even the most unpleasant subject. I was correct.

"Comrade major," he finally began. "I have some trouble landing under such conditions. I could barely control the drift. Could I please have an instruction flight in the two-seat trainer?"

I must admit that this statement surprised me; after all, no one had any complaints about the pilot's landing. But the way the officer spoke gave me the feeling he had thought his decision through. Understanding this I promised to look into it thoroughly, but advised him to go and rest for the present.

The officer's behavior gave me cause to reflect. It was not the first time Chuprik had been critical of his own efforts and abilities. One earlier time, after the first independent flights in the new aircraft, he had also told flight commander Guards Maj V. Voronov about his mistakes in landing. He had landed with a high flare-out and could not understand why it had happened. Therefore he asked for help and a check flight.

An experienced pilot who then flew with him in the two-seat trainer understood immediately that his mistake was caused by incorrect distribution of

attention during landing. After the flight the commander explained the essential points to the officer, gave him methodological recommendations, and assigned additional exercises in the simulator and the airplane cockpit. The young pilot worked hard carrying out the instructor's orders. Step by step the flight commander and I watched the officer master this important element of flight training. In the next check-flight he landed his powerful missile plane irreproachably, and after this no more deviations were seen. In the present case also, the officer's request for help in mastering landing with a side wind illustrated above all his serious approach to flying, his professional maturity.

We should note that not all pilots are up to such frankness. Unfortunately, a false understanding of professional honor and prestige is still encountered among some young people. Young pilots try to fly on their own, without guidance, as quickly as possible, even if they are poorly prepared. In such a case, if the instructor is not attentive and principled enough the results may be very surprising.

I told the regimental commander about my talk with Chuprik. At the morning personnel formation the commander used the young officer's behavior as a good example. And during preliminary preparation we talked frankly with Chuprik. It became obvious that he did not have a completely clear understanding of certain characteristics of the behavior of the new plane in a sidewind. Chuprik was assigned to present a report to the personnel of the squadron on the subject "Characteristics of Landing a Variable Wing Geometry Plane in a Side Wind." When we suggested this rather complicated subject to the pilot, we were counting, of course, on his conscientious attitude toward assignments in the first place and, in the second place, on the fact that after mastering the subtleties of this branch of aerodynamics it would be easier for him to master the landing in practice.

As we had expected, the young officer went into the topic with his characteristic seriousness. When he was not at practical training periods he spent his hours on textbooks, sitting in the library until late in the evening.

Soon he presented his report to the personnel of the squadron. Having gone thoroughly and comprehensively into the essence of the matter, he had come to understand what to do when landing in a side wind and was able to explain it to his audience.

However, this incident also forced the commanders and political workers to consider something else. Just one officer had talked about his difficulties, but what guarantee was there that other new pilots had not experienced the same difficulties? Therefore, check training periods were held with all personnel of the unit in attendance. These periods showed that several young pilots had not yet mastered the landing with a side wind. A decision was made on the spot to intensify instructor training as well. The unit commander ordered command training periods and flights conducted to improve their qualifications.

Then later the new pilots began practicing missile launches at the range and the results of the first flights showed that some of them had unsatisfactory films. This gave reason to suppose that there were certain omissions in the methodology of teaching how to use the sighting equipment and weapons. At the methods council experienced instructors and engineers discussed each pilot operation in the cockpit and worked out exhaustive recommendations.

It must be admitted that our commanders and instructors were certainly not experienced enough in retraining flight personnel then, especially not new pilots for third-generation aircraft. This experience came literally piecemeal during the training process. This, of course, made it more difficult to master the new combat machinery, but it did not in any way lower our accountability for timely, high quality performance.

In accordance with the decision of the methods council, the weapons engineer gave lectures and conducted seminars with squadron flight personnel on using the weapon controls. Thanks to this and their own careful independent work the pilots developed a good knowledge of theoretical foundations of the new means of fire. In addition, however, we gave serious attention to simulator training and monitoring readiness for actual flying. Flights in the simulators were made as complicated as possible according to a predetermined system. We introduced "failures" of the sight and weaponry at the most crucial stages of the assignment and tried to get the pilots to evaluate the situation quickly and intelligently, adopt the most expedient plan, and act precisely and confidently in conformity with it.

Making simulator training periods approximate real conditions allowed pilots to accomplish two missions at once: develop skills in working with the cockpit equipment and overcome the tension which was a serious hindrance in the air. In this way we also stepped up the psychological training of new pilots.

Guards Maj V. Korotkov, deputy squadron commander for political affairs, suggested that we hold an open party meeting to increase airmen's accountability for flight and fire training and the quality of aircraft servicing. At this meeting communists, Komsomol members, and non-party people spoke energetically. Several practical suggestions were made. And one of the points in the meeting's resolution was that personnel would master combat application of the aircraft completely during the socialist competition which was underway.

We also devoted a great deal of attention to pedagogical training of the instructors. At a meeting for leadership personnel of the squadron we discussed methods of working with subordinates and pinpointed the main line of action, the individual approach with due regard for the character traits and personalities of the pilots. I recall the following case.



Guards Sr Lt F. Korzhevskiy was among those who did not complete the combat application exercises. Training came harder for him than for others. It seemed to us that traits of his personality were important in this. He was a somewhat inhibited person, inclined to take offense and very sensitive to criticism by his superiors. He was often heard to say that he was given fewer flights than others and that in general there was prejudice against him. Naturally, this attitude was not helpful in mastering the new equipment or in his mutual relations with the collective. But the pilot loved to fly and had an enormous desire to master the occupation of aerial fighter. He needed help.

So Guards Maj V. Voronov, flight commander, decided to fly in the two-seat trainer plane with Korzhevskiy and show him how to operate the aircraft control system. On the day before all elements of the flight were practiced in detail on the simulator and the pilot's theoretical knowledge was checked. Everything seemed to be in order. But when they were in the zone for performing simple aerobatic figures the instructor noticed that Korzhevskiy was working the controls in too jerky a manner. This, of course, made for messy flying. Major Voronov advised him over the intercom to operate more calmly and smoothly. Then after they landed he pointed out mistakes to the pilot. And he was somewhat surprised when he heard the following answer.

"Comrade major, I thought that you would take the wheel and not let me fly."

"How can it be that all the detailed explanations I gave him in training period about flying went for naught," the flight commander thought then and decided that he had apparently not taught him enough. Day after day the flight commander and the young pilot worked hard and persistently. Several other gaps in Korzhevskiy's training emerged in the course of study. But it was gratifying to see how the young aviator's spirit warmed as he acquired skills and knowledge. It turned out that his difficult personality was not a cause, but rather an effect of the fact that the pilot, lagging behind his comrades and seeing that they were pulling away from him in the program, felt himself somehow inferior. And, naturally, this depressed him. His self-respect suffered and sometimes he took advice as ridicule or a reminder of his failures. But now the pilot believed in himself; he became more sociable and his work went well. There were no more "empty runs" in practice battle.

All pilots are joined by a desire to attain the heights of flying skill. This creates a favorable atmosphere in the collective. Last year our squadron won the honorary title of outstanding. But we understand that what we have achieved is not the limit, that after achieving this lofty recognition we must work even harder to keep it and to move on to new successes. This is not easy, of course, but it is the only way.

That is exactly how all our pilots, technicians, and aviation specialists understand their valiant missions. All the personnel of our squadron

strive to improve combat skill steadily, bolster discipline and organization, and raise combat readiness and technical sophistication by every means to achieve optimal results. The preliminary results of socialist competition during the winter training period give reason to believe that the fighting men will fulfill the socialist obligations they assumed for the 60th anniversary of Great October.

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### IMPORTANCE OF 'FLIGHT IMAGE' IN PILOT TRAINING STRESSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 77 signed to press  
31 Mar 77 pp 12-13

[Article by Col V. Tsvarev, Honored Test Pilot of the USSR: "There Is a Flight Image!"]

[Text] It is commonly known that accident-free flying work depends entirely on how well pilots are trained. Therefore the issues raised in the article "Flight Image" by Maj Gen-Engr Yu. Dobrolenskiy and Col Med Serv V. Ponomarenko in No 4 of the journal AVIATSIYA I KOSMONAVTIKA for 1976, in particular with respect to optimal interaction between the human being and the machinery, are very interesting and timely. At first, however, it was hard to even understand the question: Is a flight image necessary?

Can there really be pilots who think a flight can be carried out by instruments, without a mental image of how and where the airplane is flying? Psychology confirms that no activity, especially not operator activity, can get along without periodically alternating visual images of the forthcoming situation.

And now it turns out that the authors' doubts are not unfounded. Some pilots, for example, support the opinion of Col-Engr I. Kachorovskiy as stated in his article "Flight Image or Instrument Analog?" (AVIATSIYA I KOSMONAVTIKA, 1976, No 8). They feel that during flight out of view of land they do not need a graphic image of the flight. Not many think that way, but in view of the importance of the questions involved, which are closely bound up with flight safety, and because the article contains a number of points which are difficult to agree with, I think the matter should be considered in greater detail.

At the start of the article Kachorovskiy writes: "To perform a concrete assignment one does not need a qualitative picture of the aircraft's position but rather precise quantitative information on its spatial position — pitch, bank, velocity, altitude, and heading." Is this true?

For example, flights in a calm atmosphere and in turbulence are qualitatively different. But the author feels that under these conditions a pilot does not need a qualitative picture of the airplane's position. "Suppose you see during horizontal flight that a bank has developed; immediately deflect the stick and line the aircraft silhouette up with the horizon."

It is perfectly obvious that if one does that in turbulence the plane will shake even more. An experienced pilot, observing a change in bank and pitch, first evaluates flight conditions qualitatively.

Let us try, as Col-Engr I. Kachorovskiy suggests, to understand what the term "flight image" means. Several definitions are given in his article. Here is the first: "a formalized image of the flight regime expressed in definite, conventional combinations of instrument readings." Or "the flight image is above all a combination of the readings of the attitude indicator and variometer." Finally, it is an instrument based "quantitative analog which arises when one glances at the instruments."

Whereas one may agree to some extent with the first definition which speaks of a "formalized image" the rest is not at all clear. Therefore, let us first try to clarify what the image is based on.

From the psychological point of view the image of flight, like any other image, is a subjective product of psychological reflection as knowledge of reality. The image is not that which the person sees and feels, but that which is reflected graphically in the consciousness on the basis of human sensations. It is a visible representation of something produced by all the sense organs, not just the organs of sight.

The flight image is an operational image, not simply a "combination of the readings of the attitude indicator and variometer" and other instruments or "certain available information about an object (image information) reflected in the consciousness and actively interacting with signal information, that is, information received by the performer from outside in the course of an action."

Therefore, the definitions of the term "flight image" suggested by Col-Engr I. Kachorovskiy are incorrect from the human factors engineering point of view. In our opinion, the definition given by Maj Gen-Engr Yu. Dobrolenskiy and Col Med Serv V. Ponomarenko is much more complete. But it also seems to us that it needs to be made more precise. The thing is that the flight image is created periodically, as necessary, which is correctly noted by Lt Col E. Moskalenko (AVIATSIYA I KOSMONAVTIKA, 1977, No 7) but not constantly and "continuously," as stated by the authors of the article "Flight Image."

May we suggest the following improved definition. The flight image is a concrete representation of the position of the aircraft in space and

of the flight as a whole, periodically recurring or created by the pilot as necessary on the basis of acquired experience, existing habits, and the action of internal (within the cockpit) and external sources of information.

There is no question that the image of even the very same flight will have characteristic features for each pilot depending on his individual personality traits. The differences in representations of the flight may be even greater among crew members with different flight occupations (pilot, navigator, flight engineer, radio operator, and the like). This appears to be why it is difficult to give a definition of the flight image that is comprehensible to everyone.

Moreover, the more conventional concept for flight personnel is "spatial position," which is the basis of the flight image but does not supplant it because the flight image is broader. The flight image includes representations of the airplane's position in space, characteristics of its behavior in different regimes, and many other factors related to flying which have deeply individual significance for each pilot and crew member. There is also a flight image in instrument flying, but a pilot can create it correctly only on the basis of instrument information within the cockpit. And he does so when necessary. Glancing at the radio compass and possessing a knowledge of the magnetic heading and distance from the airfield or checkpoint, the pilot can picture the terrain over which the airplane is flying and visualize its position in space by the attitude indicator. But sometimes, having concentrated his attention on some mission, the pilot loses his flight image. In this case, successfully restoring it depends largely on his experience and the completeness and quality of available information.

That is why we cannot agree with Col-Engr I. Kachorovskiy's statement that there is no visual image in instrument flight.

Now let us try to understand what the phrase "instrument analog of the flight image" means. In the article "Flight Image or Instrument Analog?" The basic meaning of instrument analog is "quantitative analog which arises when glancing at the instruments."

It seems to me that this is not quite exact as a definition because when a pilot glances at the instruments it is not an "instrument analog" which occurs, but often the image of flight itself. In certain stages of flight, however, it is true that there may be no image. This is demonstrated quite well in the example with the AGI-1 attitude indicator. Because he has practiced his skills until they are automatic the pilot controls the aircraft's banking using the lower instrument index. It does not always graphically represent the airplane's position in space at the given moment. The actual position of the plane with respect to banking is supplanted in his mind by an abstract position, that of the lower index of the instrument relative to its scale.

But the most interesting thing is that this skill is abstract flying and cannot be developed without creating a flight image, without a relation to it and reliance on it. The so-called instrument analog can be created initially only on the basis of the flight image itself. After he has reinforced the conditional relationship between instrument readings and the flight image the pilot will be able to fly the plane without a graphic representation of it at the given moment.

What is the difference between the flight image and its instrument analog?

In our opinion, the flight image is above all a general, concrete, graphic representation of the position of the aircraft in space where the qualitative aspect prevails over the quantitative. The instrument analog, by contrast, is a narrower, abstract, formalized representation of particular components of the flight image where the more precise, quantitative aspect prevails over the qualitative.

The flight image forms involuntarily or is created when necessary on the basis of all the pilot's life experience, habits, and knowledge and all sources of information including the instrument analog. A correct image, especially in visual flight at low and medium altitudes with good visibility to ground orientation points, occurs involuntarily without any effort by the pilot, even one without adequate experience. Under other conditions certain efforts are required to create the flight image and they depend on flight conditions, the professional experience of the pilot, and the quality and quantity of information being received.

The instrument analog is created only on the basis of information within the cockpit and conditional relations reinforced by practice between this information and the actual flight image. When such a relationship is sufficiently reinforced it too may occur involuntarily. This is nothing more than "automatic" habits in controlling an aircraft.

To control an aircraft on the basis of a flight image the human being must make conscious efforts, that is, a thinking pilot is required. But to fly a plane on the basis of the instrument analog, that is, to combine the arrows and indicators in the necessary direction, does not necessarily require a pilot in the control element. The autopilot and automatic control system based on programs contained in them handle this mission better. But one must not forget that the program in the automatic control system was created by a human being on the basis of an image of the situation in which the flight would be made.

From what has been said above it is apparent that these two methods of controlling an aircraft cannot be set against one another. During flight the pilot periodically switches from one method of flying to the other, from the graphic image to the abstract and back. Both are important. Sometimes it is even difficult to draw a clear line between them. Therefore, optimal flying is possible only where the flight image and its

instrument analogs are harmoniously combined (but the former is decisive). And in this sense, it seems to me, Maj S. Ivanov (AVIATSIYA I KOSMONAVTIKA, 1977, No 3) is correct.

But what about special situations in flight? For example, when the engine malfunctions in takeoff before the plane leaves the ground and the pilot performs all the essential actions with lightning speed and prevents an accident. How was he able to do everything correctly in such a short time? What kind of flight image is there here when the hands and their movements are faster than the pilot's thoughts? At first glance this contradicts everything stated above. Nonetheless, the pilot in this case does have a flight image.

The point is that psychologically the engine failure was not unexpected to him. Before flying he had thought over possible emergencies, created images of various situations, and then mentally played out all actions essential to come out of them successfully. While training on the ground the pilot linked the flight image in special situations with the necessary actions. And when the engine failed under actual conditions the image which occurred of the familiar situation "switched on" the program of actions planned and reinforced ahead of time. And this is also the answer to Colonel-Engineer Kachorovskiy's question about whether it is dangerous to fly if one expects a failure of instruments or systems at any moment? No, it is not dangerous if only one does not panic. It is much more dangerous to fly if one is not prepared either psychologically or practically. Danger is not frightening when a person knows that it exists. It is worse when it is unexpected. Therefore, the feeling of caution and even of danger which arises in pilots in certain difficult situations is a useful feeling. It helps them be on guard at a necessary moment and, if necessary, to act coolly and purposefully.

All this does not mean, of course, that during a flight the pilot thinks of nothing but danger and keeps the special situations constantly in mind. He is a human being, after all, and can anticipate a situation with a certain probability and decide when to give greater attention and be ready to act immediately. Naturally, such special cases as failure of the undercarriage to extend do not require immediate actions from the pilot. He has sufficient time to think everything over and make a correct plan.

One cannot help asking why Col-Engr I. Kachorovskiy persists in advocating the principle of flying by instrument analog and argues that training for flight personnel should not be based on the flight image but rather on a "formalized program of actions," that is distribution of attention in each stage of flight.

This is understandable, because it is not at all easy to change established opinions and traditions which have served well for decades in training and educating flight personnel.

The training methodology based on optimal distribution of attention when flying by instruments is constantly being improved. Concurrently with it the methodology for creating a correct flight image in the pilot is developing.

A model of the airplane, a mock-up of the airfield or range, practicing the flight by a "walk-through," or simply talk are all methods used to create a correct graphic image.

Experience demonstrates that the most effective way to create a correct flight image and to develop habits in flying by instruments is systematic training in simulators, in the airplane cockpit, and especially under real flight conditions.

In addition to flying skills and habits, one must also have profound knowledge of the aviation machinery and its characteristics. An outstanding knowledge of the airplane one is flying makes it easier to foresee the flight situation and to be psychologically prepared for possible complications. In other words, the pilot should learn how to anticipate the situation and foresee events. This is possible only on the basis of a graphic flight image.

Our airplanes and helicopters have the most up-to-date piloting, navigation, and other equipment. But some instruments like the AGI-1 attitude indicator force the pilot to think abstractly. At the same time, with other instruments like the AGD attitude indicator the pilot can quite easily create an image of the plane's position in space. This does not mean that the principle of showing the "view from the aircraft," according to which the AGI-1 is built, is worse than the principle of indicating the "view from the ground" used in the AGD. There are no poor views. The thing is simply that the human factor has not been considered adequately in building certain piloting instruments, especially those which apply the principle of indication by the "view from the aircraft," where the pilot is forced to think abstractly.

Abstract piloting where the process of control involves a simple combination of certain arrows and indicators will unquestionably be further improved, but only on the condition that at any moment the pilot can easily create a real image of the flight. Therefore, the basic piloting and navigation instruments should be graphic enough that when the pilot glances at them a concrete visual image of flight will involuntarily be created, approximately like what occurs in visual flight during clear weather.

At the present time all instruments do not give an image-type representation of flight, especially the automatic and director control instruments. The pilot is forced to create the image using duplicating instruments, even though this involves some difficulties. Nonetheless, the duplicating (stand-by) instruments back up the automatic and director systems and insure proper safety and successful performance of the



combat mission. They cannot be neglected. If reliability is the chief element in safety, flight safety is the main component of successful performance of all flight assignments. And, of course, flight safety and accomplishment of the combat mission cannot be pitted against one another. Without consideration of flight safety all other indices lose their meaning.

The improvement of aviation machinery, methods of incorporating it, and methods of training aviators and insuring flight safety are a matter of national importance and an essential condition for high combat readiness among our aerial fighters. Thus, when training flight personnel it seems we should rely more confidently on the concept of the "image." This will help in the transition from some formalistic principles of training which still exist to more concrete and comprehensive ones and will promote a qualitatively new level in the training process.

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## EXPERIENCES OF TEST PILOTS DESCRIBED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 77 signed to press  
31 Mar 77 pp 18-19

[Article by Lt Col Yu. Kislyakov: "Fourteen Turns"]

[Text] A fine, persistent rain had been falling since morning. The cold wind drove low, shaggy clouds by. It seemed that they touched the fins of the airplanes which were already lined up for takeoff. The weather did not please the pilots. The planned flights might be called off.

"It doesn't look like things are getting any better," the flight control officer said doubtfully.

"They definitely will," the weatherman said, entering the conversation. "In an hour everything will be as ordered."

As the meteorologist anticipated, about an hour later the rain stopped. Gradually the lower boundary of the clouds became more distinct and visibility improved.

"There, comrade commander, you see that the weather is just what you wanted. A minimum for all parameters."

"You're right, that's all I can say. Well, let's get started."

The crew which flew out to scout the weather confirmed that meteorological conditions throughout the region were complex but, as they say, within the bare minimum for flying. After analyzing the weather map and reconnaissance data one more time the commander decided to fly.

"Sit down, Valeriy, set yourself up and 'break in' that automatic pilot. Take off when ready." And then, as if regretting that he was not the one performing this assignment today, he added jokingly, "You people are lucky. You sit and look and don't have to do anything."

The medium-height pilot with light brown hair to whom the commander was speaking shook his hair back and donned his crash helmet.

"I'm not breaking it in, it's breaking me in. So who knows who is better off," he grinned.

Indeed, Colonel Migunov's assignment was not difficult at first glance: check the operation of the automatic control system for the plane. Each such flight is unique in its own way. The machinery delivers up various surprises before it becomes obedient to the pilot's will and hands. And before this happens it is run through various flight regimes by test pilots and polished and refined on the ground by specialists. To make the automatic device the pilot's helper and take the maximum load off his attention is not an easy job; it requires a great deal of time and constant creative searching.

Migunov got into the cockpit, put on the straps and snapped the parachute latch in no hurry, examined the equipment, and checked over his map. In his mind he ran through the assignment from start to finish one more time. Even though he knew it by heart, it had become a habit and vital necessity to check himself before the flight.

"Everything is fine!" he remarked in satisfaction to himself and gave the order to start the engine.

Taxiing onto the runway he checked the instrument readings and reported to the flight command post.

"Takeoff is authorized," came the flying control officer's answer.

Switching on the autopilot Migunov released the brakes.

The airplane moved smoothly out and began its run. The horizon came at it faster and faster. The square plates of the concrete runway, which had been clearly distinct at first, merged into a solid grey ribbon. The plane left the runway and began to gain altitude. Now the pilot had an insurance role. With his hand on the control stick he was ready to switch the autopilot off at any moment and take over control. But he did not have to intervene.

The undercarriage was up. Just a little more and then the plane was enveloped by light grey clouds. The cockpit light was covered with a wet emulsion. Usually in such conditions the pilot devotes all his attention to the flight instruments and reacts sensitively to any movement of the controls, even the smallest one, by a deflection of the control surfaces. But Migunov had only to watch, remember, and record ...

The plane broke through the clouds. Sunlight streamed into the cockpit. The cloud cover, stretching right to the horizon, remained below.

The airplane performed the assigned turns. Migunov watched the instruments carefully and wrote down certain readings in the tablet on his

knee. Then, building the plane up to a calculated speed, he put it into a steep gain in altitude and at an assigned angle turned on the autopilot. The pilot was pulled away from his seat but the firmly fastened belts held him down. The hose of the oxygen mask and the cord of the interphone headset floated up before his eyes.

"Pretty sharp. Clear. When recovering from the climb angle the negative overload was minus 2," the pilot recorded. And he noted to himself that it had been greater in previous flights.

Before going into horizontal flight he put the plane into a dive. It picked up speed rapidly. It was time to recover. Migunov switched on "Recover horizontal." This time the picture was different. A five-fold overload pressed him sharply against the seat. It would not have been anything if he himself had been flying. After all, whether flying smoothly or roughly, a pilot is ready for such changes in the flight regime. But it is more difficult to take abrupt evolutions on automatic control, especially if they are unexpected. The test pilot, however, is ready for them.

On the ground, of course, the specialists will check everything, study the records of the flight recorder, make corrections, and fix things so that recovery from the maneuver will be smooth. In the meantime he must watch and make records.

The program was coming to its conclusion. The plane turned smoothly into its runway landing heading. The pilot extended the undercarriage and reported to the flying control officer.

A glistening white cloud mass rolled toward it and in an instant the plane was lost in it. It suddenly became dark and seemed cold. The plane was descending exactly by heading and glide path. One thousand meters, five hundred, three hundred....the clouds gradually thinned.

The ring of the outer marker sang out. Ground orientation markers appeared, followed by the middle radio marker. From low altitude the pilot could clearly see the landing strip.

"That's it, fellow, your mission is completed," Migunov turned off the autopilot. And landed visually, manually. The plane touched down smoothly and then taxied to its parking spot.

"Well, Valeriy, what news?" Specialists gathered around the pilot.

His impressions of the flight while still fresh are very important for those who are improving the control system.

"Generally fine. But I have a few remarks."

And there began a long, detailed conversation understandable to specialists only.

"Generally fine." But how many alarms and disturbances, how much searching and sometimes disappointment lie behind these words. It is not so simple to bring the designers' ideas to life. Substantial time occasionally passes before a particular instrument or system becomes acceptable for introduction on series-produced machines. Sometimes the pilots asked about some unit or aggregate on the plane say: "Amazingly simple and convenient." And they do not think that behind this simplicity is the enormous creative labor of engineers, researchers, and test pilots.

Research does not stop even for a plane which has become standard. It seems that the plane has been tested and retested and nothing new could be found in it. But nonetheless, test pilots try it out in all regimes, searching for new, previously unknown possibilities in order to make even fuller use of them under battle conditions.

For example, take the Mig-21. This aircraft has given a good account of itself. Pilots have long held the opinion that the Mig will not go into a spin. But if it is flown incorrectly, it can be driven into a spin. "Driven" is the correct word. Suppose during an aerial battle that the pilot is carried away with the attack and does not want to let the enemy out of his sight during inverted flight and he has pulled the stick too far and at the same time tried to keep the central mark on the target with the pedal. In this way he has created the essential conditions for stalling. In order to give exhaustive recommendations on aircraft recovery, test pilots fly into a spin, stall the plane from altitudes, and study the behavior of the aircraft. The conventional steep spin in the Mig has been studied quite thoroughly, we must admit, and actions to recover from it are simple. A flat inverted spin, which is nowhere near as frequent, is much more interesting.

Before testing a new plane once Valeriy Migunov flew in a two-seat trainer with Mikhail Illarionovich Bobrovitskiy, flight instructor and Honored Test Pilot of the USSR. It was, as the test pilots say, "warm-up period." The flight assignment envisions practicing entering and recovering from normal and inverted spins. After reaching an altitude of 11,000 meters in the zone he switched the plane to a climb angle of roughly 40 degrees and brought the engine control lever to the assigned revolutions. The velocity arrow crept steadily to the left. When it reached 350 kilometers an hour the pilot turned the plane over on its back and then, not letting the nose drop, pushed the control lever sharply away and almost at the same moment put the rudder ahead as far as it would go. The main thing was to spin the airplane.

The plane was thrown toward the side. The two-fold lateral overload pressed the pilots against the side of the cockpit and they hung upside down by their safety belts. At a small angle of inclination the aircraft turned around an invisible axis in space, almost outlining the horizon with its nose. This was a real flat spin.

One turn, then a second and a third. Recovery was possible and Migunov set the controls for recovery. But it did not come off. The plane continued to turn as if held in position. He tried again with no result. The rotation was confident and stable. He glanced at the speed; the arrow stood between 200 and 300.

"I'll try once more."

But the effect was the same. The ground spun in a crazy carousel. The altimeter inexorably dropped one thousand meters after another. "Why won't the plane come out of it?" the pilot thought and his brain worked with absolute precision. The aircraft did not respond to the usual control actions. But there was no clear solution.

"I'll have to try different ways to recover while I still have altitude. But what if it doesn't come out? Ditch the machine? No way!" Then, as if he had been following Migunov's thoughts, instructor Bobrovitskiy said something through the intercom. But, apparently because of the negative overload, his headset was pulled loose and it was impossible to understand him. At an altitude of 6,000 meters Migunov again tried to bring the plane out of the spin. He vigorously set the rudders in neutral and pulled the stick fully toward himself. The horizon suddenly moved abruptly upward. The plane dropped its nose and went into an ordinary steep spin. The picture changed. The feeling of weightlessness disappeared. Directly before their eyes the many colors of the earth flashed. The pilot sighed in relief and the rest, as they say, was a matter of technique.

He set the controls at neutral. As if shaking off a load that was too heavy, the plane spun one last time and went into a stable dive. It came out into horizontal flight at an altitude of 3,300 meters.

"How do you feel, Valeriy?" Bobrovitskiy asked over the intercom.

"Normal."

"You went through fourteen turns. That's something to think about. Let's go home."

After the landing the pilots had a lively discussion of their flight, shared impressions with other pilots, and recalled the details. To the specialists they brought back rich information which was carefully studied in detail later.

How does the aircraft behave in particular cases? What actions should the pilot take? These questions are answered first of all, of course, by theoretical research. In the air the pilot acts in reliance on research findings, personal experience, and the experience of his comrades, judgment, calm calculation, and professional sense. Learn as much as possible, if not everything, about a new phenomenon while still on the

ground and only then go up in the air -- this is a rule which Valeriy grasped in his very first days in the difficult job of test pilot. A further rule is to self-critically evaluate one's actions and behavior, study test materials thoroughly, prepare carefully for each flight, and drill.

While still a cadet at the Khar'kov Air Club and then later at the Orenburg Flight School as well (from which, incidentally, he graduated with distinction), Valeriy worked hard and purposefully.

At school Migunov was a pilot-instructor and deputy squadron commander for political affairs. This is interesting and important work. But he secretly dreamed of testing new airplanes, of being on the forward edge in the struggle for scientific-technical progress in aviation.

And when such an opportunity presented itself Valeriy threw himself into it, as they say. He now flies a great deal and with enthusiasm. The communist Migunov is given tests of varying difficulty, but he invariably performs his flight assignments well. With a boundless love for the quite difficult profession of test pilot, Colonel Migunov and his comrades take mighty fighting machines up into the sky and give them the go-ahead for use in the name of strengthening our aviation and reliably defending the air frontiers of our native land.

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## FLIGHT SERVICING DEFICIENCY ANALYZED, EXPLAINED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 77 signed to press  
31 Mar 77 p 41

[Article by Capt-Engr A. Aksenov: "Right Bank; It Could Have Been Avoided"]

[Text] After authorizing the next two fighter planes to take off the flying control officer looked over to the plane on its runway landing heading. As he watched he saw the plane, at approximately 150 meters off the ground, bank vigorously to the right. Before he could give a radio command the plane came out of the bank. The pilot had been cool and smart. He had immediately taken up the flaps and landed the aircraft safely.

The plane taxied to its parking place. Now the specialists had to determine why the plane had banked vigorously to the right when the flaps were extended on the landing approach.

"We'll start with the flap and slat control system," the engineer ordered.

An electrohydraulic unit was connected up and several tests made of the extension of the flaps and slats to takeoff and landing position, including the time and synchronization. They found no deviations from technical requirements; the system was working normally. Then they carefully examined the linkages, rocker arms, mechanism, and flap and slat control wires. No traces of contact between the parts and assemblies and the fuselage and wing were found.

While the specialists were examining the aircraft, the engineer analyzed possible causes of failure in the control system. "The plane banked right when the flaps were extended," he reasoned. "Apparently the left flap began to extend but the right one did not. Possibly they both extended, but not together. The control system has a synchronizer that prevents one flap from extending if the other is immobile. This mechanism is not damaged and the synchronization linkages are not deformed. That means that the failure was not related to the kinematic lock of the right flap. It is most likely that the plane banked during landing because the extension of the flaps was not synchronized. This could have been caused by increased friction or by some foreign object that got into the flap and slat control system."



The engineer ordered that the linkages that connect the flap control wire kinematically with the slat wire be disconnected. After doing this the specialists found that the engineer's assumptions were correct. The flap and slat of the left wing extended properly, and so did the right wing flap, but its slat did not move.

An examination showed that parts of the nonlinear control mechanism of the right flat had jammed owing to increased friction. When they removed the housing of the mechanism the specialists saw that its connecting links were deformed.

Further study showed that there had been a special examination of the flap control system of the plane the day before. Afterward, while testing the system, the airplane technician found that the right slat did not extend fully when the flaps were put in the "takeoff" position. In searching for the trouble he found in the nonlinear control mechanism for the right slat a fixing pin that he himself had forgotten to remove before testing the system. He removed it and tested the control system several times; it worked normally. Therefore he did not report the incident to anyone. It did not occur to the officer that the aerodynamic loads during flight might disrupt the working of the system after such a test. In this way, the technician's mistake on the ground led to a dangerous situation in the air.

In conclusion I will remark that when using neutral-position fixing pins for mechanisms of the control system of this type of airplane specialists must observe the requirements of the appropriate instructions carefully. In addition, it is wise to organize strict accounts of fixing pins and categorically prohibit the use of nonstandard and unaccounted-for pins.

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## HELICOPTER FLIGHT TRAINING DEFICIENCIES DISCUSSED

Moscow AVIATSIYA I KOSMONAVTIKA in Russian No 5, May 77 signed to press  
31 Mar 77 pp 44-45

[Article by Lt Col Shlykov, military pilot 1st class: "The Instructor Did Not Help"]

[Text] Cadet A. Gula was making a training flight along a route to practice visual orientation during the daytime under simple weather conditions. The future pilot felt he had prepared carefully for the assignment, but subsequent events demonstrated that he had certainly not taken account of all the factors which determine successful actions in the air. Moreover, his knowledge of the operation of the equipment under certain working conditions proved fairly superficial.

He was flying at an altitude of 600 meters over very rugged terrain with a varying cover of vegetation. The outside air temperature was 23-25 degrees. The land, of course, was greatly heated up.

Ten minutes after passing the first turning point on the route the helicopter hit an ascending current. Attempting to hold the assigned altitude, Gula reduced the pitch of the main rotor to the minimum and made a correction to the left. As a result the revolutions of the engine turbocompressors dropped to 60 percent. The main rotor went into autorotation. When the ascending current ceased acting the helicopter began to drop. The cadet made a correction to the right, but the revolutions of the turbocompressors did not increase. Gula decided that the engines had failed and immediately reported this to the flying control officer. At his command he picked out a landing area and made an airplane landing.

Gula already had a good deal of flying time in this type of helicopter. Nor had there been any interruptions in his flying program. On the day of the forced landing he was making his second training flight on the route. Then why did this potential cause of an accident occur?

As it was learned later, the cause was an error in operating the helicopter. The cadet did not know that when making a right-hand correction the revolutions of the turbocompressors were not supposed to increase. Therefore,

when he was flying in a very turbulent air mass and hit unusual conditions (the strong ascending current) he acted too quickly and made a mistake in his attempt to correct the deviation that had occurred.

To assume the assigned flying altitude all that he needed to do was lower the pitch of the main rotor 1-1.5 degrees, and then set the engines back in the regime necessary for horizontal movement.

Cadet Gula had a chance to correct his mistake. To put the helicopter into horizontal flight with the pitch of the main rotor fully dropped he should have set the correction all the way to the right and smoothly raised the pitch, paying special attention to maintaining its revolutions. It must be considered in this case that the revolutions of the turbocompressors increase relatively slowly when the pitch lever is pulled and at first the revolutions of the main rotor even decrease slightly. After 5-7 seconds, however, the operation of the automatic engine controls is restored and the instrument readings meet technical conditions.

Some of the blame for this also falls on Gula's senior comrades, above all pilot-instructor Sr Lt N. Kostyukov. He was the one who failed to teach the cadet timely and correct actions in a complicated situation and did not explain how the automatic controls worked when making a correction.

This case reaffirms the long-familiar proposition that poor knowledge of the aviation equipment and weak moral-psychological conditioning lead, as a rule, to dangerous situations in the air.

Here is another example. Cadet F. Pasechnik was performing a check flight into a zone with pilot-instructor Sr Lt Yu. Semenov. On a lefthand banked turn the cadet became distracted from the instruments and permitted the bank to go to 28 degrees. Trying to correct his mistake he brought the helicopter vigorously, at a tempo of 1.5-2 seconds, out of the left bank with the autotrimmers button pushed. This created a right bank of 5-6 degrees and increased the angle of pitch to six degrees. As a result of these improper actions the blades of the main rotor were put at hypercritical angles of attack -- 28 degrees. Powerful shaking began, and lasted for 25-27 seconds. Pasechnik lost his self-control and began pulling chaotically on the throttle and collective throttle-pitch levers.

Pilot-instructor Semenov apparently did not have an adequate understanding of certain questions of practical aerodynamics and the tenets of crew instructions. Therefore, he could not understand the reason for what was happening. In addition, he violated flight training methodology by giving the cadet too much freedom of action. And then he was too late taking over control.

The circumstances of this potentially dangerous air situation and the poor use of the controls by the crew were recorded on the monitoring tape. The illustration [not reproduced] shows a section of the flight monitoring record with the change in the flight parameters when Pasechnik made his mistake and the subsequent correction. As in the first case we discussed, this emergency in the air was a result of poor knowledge of the aviation

equipment and practical aerodynamics and inadequate moral-psychological preparation of the aviators.

Cadet Pasechnik had not been taught the correct way to use the autotrimmers. Therefore, instead of short, regular punches on the button to remove the load from the control levers he held it down, which forced the autopilot to operate in a synchronization regime. When the autotrimmers button is held down control of the helicopter becomes too sensitive and requires exact and timely responses by the control surfaces to deviations; Cadet Pasechnik did not yet have the ability to make such responses.

To correct the mistake it was necessary to release the autotrimmers button and stop the chaotic movements of the control surfaces. First reduce the angle of pitch by shifting the control stick forward and then, with short punches of the autotrimmers button, remove the load from the control levers and bring the helicopter into horizontal flight. This flagrant mistake could have been avoided completely, simply by smoothly reducing the bank, for an authorized bank of 28 degrees is not dangerous. But the hurried decisions and operation with the controls made the situation worse.

In these flight situations the cadets showed some lack of preparation for performing the assigned missions owing to their inadequate knowledge and poor moral-psychological conditioning. This also led to too much tension, which hindered both future officers in making an intelligent evaluation of the situation that had arisen and quickly finding a way out of it.

Special moral-psychological training with the cadets must be improved if such incidents are not to recur. The main thing in such training is to increase the functional activism of the future pilots, mobilize their will to perform a concrete assignment. This can only be done by increasing the sense of personal responsibility, molding a clear orientation to the upcoming activity. The instructor must not only explain its meaning, importance, and conditions, but also have the students practice the upcoming actions in the classroom, in trainers, and in the actual helicopter. In addition, it is very important to see that the pilot has his mind set on performing the mission outstandingly.

An analysis of the dangerous air situations considered above allows us to find mistakes in training, methodological, and preventive work to insure flight safety in the subunit. We can confidently say that these things would not have happened if cadets Gula and Pasechnik had had a solid knowledge of the workings of the equipment they were using. Furthermore, similar errors had been noted earlier in other fighting collectives, and all flight personnel had been informed of them. However, pilot-instructors Kostyukov and Semenov failed during ground training, preliminary training, preflight preparations, and the training flights to make their charges aware of the essential points of the mistakes they made and did not explain to them the correct procedures to avoid such situations.

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## ACTIVITIES IN MILITARY-OPERATED INDUSTRIAL PLANT

Moscow KRASNAYA ZVEZDA in Russian 20 May 77 p 2

[Article by Engr-Lt Col L. Shapiro, enterprise chief: "A Look to the Future"]

[Text] Our enterprise produces water mixers, towel driers, and various types of hydrants, products which call for thousands of workers and which no construction projects can do without. For 25 years, our collective has coped with monthly fulfillment of the plan, without breakdowns in the production process, continually reducing production cost, and raising the quality of the articles. Thus, where manufacture of one water mixer took us more than 50 minutes in 1970, in 1976 it required less than 40 minutes. Besides that, the amount of non-ferrous metal used for that article has been reduced.

Having achieved early fulfillment of the pledges for 1976 and for the first quarter of 1977, the enterprise administration and the party organization are trying to find new reserves for production development in order to convert to an enterprise with a high production culture and high labor productivity within the period called for in the long-range plan.

The main five-year plan task for our production is elimination of manual labor, mechanization and automation of labor-intensive monotonous processes, construction of contemporary everyday buildings, and creation of a well-equipped rest area. All of this, of course, can be accomplished by the collective only if it puts its creative energy to work.

Few of us in the past could imagine that processing of several components, requiring from three to six technological operations and accomplished for years on a variety of turret and other lathes, could be accomplished on one semiautomatic lathe and that the worker's function would entail monitoring the lathe operation. But, the machinist brigade led by N. Shchegolev, which implemented a suggestion made by designer B. Arkad'yev, showed that this is possible. They had to put forth quite a bit of effort. At first, they ordered a special lathe. Its productivity turned out to be too low. The inventors decided to "modify" it. Now that the lathe has been upgraded, one worker can produce what it formerly took four people to do.

A lot of equipment at the enterprise was recently upgraded. As a result, labor productivity of many operations almost doubled. Now, one of our biggest "choke points" is the manual polishing and buffing section for components to be plated. Since last year, designers and engineers have become involved with this problem as well. It should be noted that the collectives from many other similar organizations in the country are addressing this problem.

Struggling to raise production culture, we decided to reexamine several old views such as monitoring technical specifications. Also, the introduction in 1975 of the system of delivery of the product upon first submittal played a major role in improving quality. At present, 23 persons at the enterprise have received the right to use personal OTK [quality control department] stamps, product quality has improved, and the number of inspectors reduced. Thus, for example, foundry hand N. Yevgrafov cast approximately 6,000 mixer casings in 1975, of which more than 11 percent were rejected. But, in 1976, he cast more than 12,000 casings and only 4.5 percent were rejected. The same can be said when checking the product output of other workers over the past 2 years.

Work better, with the greatest effectiveness and least labor expenditures. Such a task is hard to accomplish unless a businesslike atmosphere is created in the collective and each worker takes an interest in the results of his labor. Colonel (Reserve) A. Pogorel'tsev, Hero of the Soviet Union and master, works in our assembly section. He expends a great deal of energy and effort to indoctrinating his comrades in a communist attitude towards labor. But, even though the section always coped with its socialist pledges, there often were instances where labor discipline was violated here as well. Comrade Pogorel'tsev brought in veterans as tutors in the indoctrinational efforts. They proposed that the best subunit be chosen. Preparations for this inspection-contest led to improved work technology, a reduction in heavy physical labor, and repair and renovation of the physical plant. The section led a new life. Cadre turnover was reduced, violations of labor discipline and injuries were eliminated, and production culture rose. The section joined the ranks of the leading sections and began to win first places in the competition.

Many other things are being done at the enterprise to increase work effectiveness and raise the production culture at the enterprise. Now, for example, we are contemplating increasing the domestic services for the workers directly at the enterprise. Thus, if in the past we washed and repaired the special clothing twice a month, now we are expanding our laundry and will dress our workers in clean special clothing weekly. We decided to soon organize pick-up points for shoe repair, dry cleaning, and semifinished goods, a barber shop, and the like at the enterprise.

In the future, we will see that the efficacy of socialist competition encompasses not only the production but the domestic and moral spheres of life at the enterprise as well. This is one of the important conditions for successful solution of the tasks assigned by the 25th CPSU Congress.

## CIVIL DEFENSE TRAINING ACTIVITIES IN A VOLGOGRAD INDUSTRIAL PLANT

Moscow KRSNAYA ZVEZDA in Russian 24 May 77 p 2

[Article by Lt Col (Ret) I. Moshkovskiy: "Where the Forward Edge of the Battle Area Passed Through"]

[Text] I had never before had occasion to visit this enterprise. But, I had known its glorious name for a long time. I recall the emotion with which the participants in the Battle of Stalingrad discussed the plant. I recall how the report in the front newspaper began: "Thirty-five open-hearth chimneys towered over Krasnyy Oktyabr'. One survived..."

And now, Colonel V. Sporov, Chief of the Civil Defense [CD] Staff of Volgogradskaya Oblast, rates the Krasnyy Oktyabr' Metallurgical Plant as one of the best enterprises as far as CD organization is concerned. This is the same legendary Krasnyy Oktyabr'.

The streets of Volgograd are especially beautiful in the spring. But, regardless of the time of year you walk them or drive along them, you can't help thinking of the past. Prospekt imeni V. I. Lenin, Alleya Geroyev, blocks of fine buildings... It was right here that the forward edge of the battle area was located back then. Catch your breath at the Home of Soldiers' Glory. Several more trolleybus stops and my fellow travelers Mikhail Prokhorovich Aparin, Deputy Director of Krasnyy Oktyabr', and Ivan Sergeyevich Kulinichev, Chief of the plant CD Staff, point out large enterprise buildings which are becoming visible.

It does not take you long to sense that the CD organization at Krasnyy Oktyabr' has been entrusted to authoritative people who know and are devoted to their task.

A parallel automatically comes to mind. I once was chatting at one factory with the chief of the CD staff. This person had held this post for a long time but he had trouble remembering the lesson directors and team commanders. He looked without fail at his list, made inquiries by phone. This portended the work style of this comrade. He knew the way to the office of the director, party bureau secretary, and chairman of the local committee. But, his direct

contacts with his workers were ephemeral, sporadic. How could he remember anyone's name?

Things are entirely different at Krasnyy Oktyabr'. The daily routes of Aparin, Kulinichev, and other CD workers and activists are more bifurcated and broader. They also solve problems in the offices of directors of the plant, shops, and services, carry on work with the masses where there are many active aides to be found.

Once, Kulinichev met Yuriy Serafimovich Shatskiy, a mechanic in the metal structures shop. It was a chance meeting, as was the conversation. A while later, Shatskiy consulted Kulinichev, who has had legal training. Ivan Sergeyevich assisted in sorting everything out. Thus, they became friends. Among their common interests, concern about improving the enterprise's CD occupied a special place.

Stands were needed to display exhibits at a lesson. "We will have them tomorrow," the mechanic averred. That is always the case. By the way, many of his volunteer assistants eagerly respond to the chief of staff's requests.

Here at Krasnyy Oktyabr', you distinctly feel that the high responsibility of all who are charged with CD and the skill of the leaders to mobilize the masses form the basis for the program here.

There are many propagandists and agitators who rally around the CD staff. In their number are supervisory personnel at the enterprise, party committee members, various specialists, veterans who long ago retired, communists, and Komsomol members. They do a great deal of explanatory and organizational work.

Kulinichev once noted that the nurses from the central laboratory were indifferent to practical lessons. They all were clock-watchers. The chief of staff did not reproach them for this on the spot. He chose another method.

The scheduled lesson for the nurses began with the showing of a special film. Kulinichev commented on the film. He spoke simply and clearly:

"Life often depends upon assistance from nurses. And, your knowledge and skills are not only needed during trying times. Could they not be required on the job, even on the street?"

Serious discussions with the commander and the political director of the nurses' team followed. In the end, these same girls and women who shrugged their shoulders and said -- "you won't make 'medics' out of us" -- began to seriously master the first aid drills.

The authority of the chief of staff, as learned long ago, derives not only from the level of his special training and his organizational talent, but also from his ability to convince those around him of the importance of the task for which each is responsible. Lieutenant Colonel (Ret) Kulinichev does not



possess the gifts of a propagandist. But, the same cannot be said of Aparin, deputy plant director. Mikhail Prokhorovich has been elected a member of the party committee 15 years running and has headed people's control at the enterprise for the same length of time.

The many successes are explained by the high authority of those who direct CD at the plant. Aleksandr Pavlovich Grishin, plant director, and the party committee support them always and in every way. They rely upon the broad-based aktiv.

Krasnyy Oktyabr' began to find itself cramped within its old boundaries. Production wings grew and continue to grow. The territory remained fixed and every single meter is carefully accounted for. But, the bulldozer blade did not even touch the walls of the central laboratory building destroyed during the war. This is a memorial to the past, to September 1942, when the Red Octobrists produced their last steel, the last rolled iron, and took up arms to join the subunits [podrazdeleniya] defending the factory.

People often gather at these walls. Seen there are Ivan Prokhorovich Aleshin, former steelmaker and one of the initiators of the Stakhanovite movement at Krasnyy Oktyabr', who was twice elected as deputy of the USSR Supreme Soviet; Ivan Pavlovich Sorokin, former plant chief engineer; and other veterans. They remember this as an operating laboratory, they recall how they put out fires and dug comrades out of the rubble. Everyone understands the logic of why they became CD activists and why they consider this their responsibility.

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## AIR DEFENSE MISSILE UNIT TRAINING ACTIVITIES

Moscow SEL'SKAYA ZHIZN' in Russian 10 Apr 77 p 4

[Article by Lt Col V. Sinyutin: "Sentries of the Sky"]

[Text] The National Air Defense [PVO] Troops keenly guard the skies of our great Motherland. They greet their holiday today with glorious achievements in comradely labor. During daily service fulfilling the decisions of the 25th CPSU Congress, PVO troops exhibit high vigilance and constant combat readiness to repulse an attack by an aerial enemy.

The report published below describes just one training day for the missilemen who, during peacetime as well, are always in the forward positions, always on the alert.

At the SAM [surface-to-air missile] regiment's command post, everything is the same as it would be in actual combat. The operators at the radar sites and those manning the automated control system [ASU] monitor an enormous amount of air space ranging from the earth's crust itself to altitudes in space. Although the soldiers, sergeants, and officers only have scopes in front of them, they are even able to see signals on these scopes reflected from flights of geese flying at a range of tens of kilometers. From here, all the information reaches the command post without delay, where it is displayed on large plot boards. Officers made wise by combat and life's experiences analyze the air situation and try to accurately determine the "enemy's" intent.

In actuality, the only aircraft airborne now are those making their everyday planned flights. PVO troops identify them by special signals: friendly IFF [Identification friend of foe]. A special training simulator plays the role of the enemy. It provides a model of an intense battle. The missilemen also improve their combat mastery with such training devices. From time to time, their skills are checked at technical exercises with combat firing.

...I gaze at the faces of the missilemen. Major G. Vinogradov, chief of intelligence, attentively studies the characteristics of the targets, compares their speeds and altitudes. This is an experienced tactician, one who knows his business. He has been at the range three times. And, he received the highest grades three times. The officer concentrated all his attention on guessing the "enemy's" intent, providing accurate inputs for combat employment of the ASU, surveillance equipment, and SAM complexes.

Lieutenant Colonel T. Pyattoyev, regimental commander, tunes the remote PPI [plan position indicator] scope, checks the functioning of the assemblies which make it possible to more rapidly and more qualitatively evaluate the situation.

At the signal "Attack!", Private I. Khomich, a diesel engine electrician, was one of the first to man his combat post. Prior to coming into the army, he worked the fields on his tractor in Rovenskaya Oblast. Now he is a missileman. Good technical training allowed the soldier to master a complex speciality in a very short time.

"Major Vinogradov, brief the situation!" ordered the commander.

The officer characterizes each target grouping, calls out the size of each raid which could be expected in the firing zone... It is evident to everyone that the "battle" will be a hot one. The missilemen understand this well. Therefore, each strives to faultlessly carry out his responsibilities as a member of the combat crew. Also among them is Corporal B. Zhulikov, who was trained to plot the information on the fire control board. He has a watch in his left hand and a glass duplicating plate in his right. The soldier fixed his gaze on the quadrant of the board where an installation is designated by a red star. That is what the "enemy" is targeted against. And, Corporal B. Zhulikov mentally erects a fortress in front of them which will become an invincible wall in their path. In actuality, such a fortress exists. It consists of missile sites which maintain a comradely watch around the clock in all kinds of weather.

Then the plotter adjusted his headset and climbed one step higher. His face is vaguely distinguishable from behind the board. Only the gold stripes on the shoulderboards clearly shine through the dull plexiglass.

B. Zhulikov was drafted into the army from Rostovskaya Oblast. And, naturally, he became acquainted with Private I. Khomich only here, in the regiment. They have now become good friends. Based upon their initiative, all the highly rated specialists in the subunit [podrazdeleniye] provide continual assistance to the young soldiers mastering their combat specialities and fulfilling socialist pledges.

...Corporal B. Zhulikov made the first plot, a second, a third. At the beginning of each track, he entered the target data, which was clearly visible to all the officers.

Lieutenant Colonel T. Pyattoyev diligently monitors the activities of the ASU operators and makes notations directly on the PPI scope: target numbers, speed, and course. Subsequently, when the battalion received target designations for a particular blip, the commander noted this with a particular symbol. Although all the enumerated information is present on the plot boards and the illuminated display, direct processing of the information makes it possible to concentrate better and recall the situation.

Two targets almost simultaneously entered the coverage of the missile control site. ASU operators Corporal S. Golovkin and Private M. Andrushchak issue the target designation. The combat crews locked on to the aircraft "with a sighter" and "destroyed" them at maximum range with sniper-like accuracy. Then, the radar station's antennas rotated to a new azimuth...

Suddenly, the station's operators reported the discovery of nuclear "explosions." A special group begins to study the new information. A bit later, at the commander's signal, the troops don their individual means of protection.

Working in gas masks is difficult. Then, the situation deteriorated. ECM [electronic countermeasures] filled the scopes. The regimental commander orders that the next target designation be issued to the battalion. But the "enemy," as if sensing that its fate was sealed, sharply reduced altitude. A critical situation arose which required another target allocation. Under these conditions, the commander makes a new decision: to shift fire to another aircraft. The missilemen accurately completed the mission. Another track on the plot board ends with the small circled cross which designates a "destroyed" target.

The training session ended. The commander and staff officers who directed it made full use of the capabilities of the training simulator, succeeded in achieving a situation which fully tasked the efforts of the troops. As a result, the missilemen took a new step towards improvement of skills, towards quality fulfillment of the combat and political training plan.

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## REGISTRATION REQUIREMENTS FOR MILITARY RESERVISTS EXPLAINED

Moscow SEL'SKAYA ZHIZN' in Russian 11 May 77 p 4

[Article: "Servicemen Transferred to the Reserve"]

[Text] How are fixed-term servicemen transferred? In what instances after their release are they sent to places where they did not reside prior to call-up for placement on the military register and under what conditions are they registered there? Our readers are interested in this information.

As a general rule, soldiers, sailors, military construction troops, sergeants, and master sergeants transferred to the reserve are sent from military units [chasti] for placement on the military register to the military commissariats of their place of residence prior to call-up for active military service. Sending those transferred to the reserve to points where they did not reside prior to call-up is permitted in the event of a change in the place of residence of their families (where documented) due to departure for organized enrollment for work in the national economy and for other special valid reasons.

Fixed-term servicemen must appear at the rayon (city) military commissariat within 3 days after arrival at their place of residence to deliver documents concerning transfer to the reserve and for placement on the military register.

Passports can be issued to servicemen transferred to the reserve on the basis of their identity cards. In accordance with USSR Council of Ministers Decree No. 678 dated 28 August 1974 "On Certain Rules for Registration of Citizens," servicemen transferred to the reserve from the USSR Armed Forces due to completion of their service commitment are registered in cities and urban-type settlements regardless of the size of the living area, in cases where they were called up for military service from the given populated point, for living area which they occupied prior to call up for military service or for the living area of their parents or other relatives.

Soldiers (without families) transferred to the reserve are also freely registered in hostels in which they resided before call-up. In other cases, they are registered in cities and urban-type settlements in the established manner if, as a result of their moving in, the amount of space accruing to each inhabitant will not be less than the norm for living space called for by civil law. The executive committees of city and rayon Councils of Workers' Deputies have the right, as an exception given valid reasons, to permit registration of citizens, including servicemen transferred to the reserve, in cases not envisioned by the aforementioned rules for registration.

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